

Astronomy 330

Review



Exam 1 tomorrow

Next Week Presentations

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Exam 1

- 40 MC questions in the classroom on Thursday!
 - Plus 2 extra credit (possible score of 105)
- You can bring 1 sheet of paper with notes
- Will cover material up to and including last Thursday's lecture.
- Major resources are lecture and discussion notes, in-class questions, and homework, the book and reading are supplemental (won't be directly on exam).
- Questions?

key Ideas

- Drake equation
- Milky way
 - Structure, fate
- Cosmology
 - Evolution, dark matter, dark energy
- Stellar system
 - Evolution of stars and planets
- Earth
 - Evolution of Earth, important elements for life on Earth
- Life
 - Basic elements of life and their origin

Cosmology

- Hubble's Law
 - How was it discovered?
 - What does it tell us about how galaxies move?
 - What does it mean?
- Big bang
 - What is it?
 - Where and when did it happen?
 - Expanding into what?
 - What are the three main pieces of evidence?

Cosmology Continue....

- A brief history of time
 - What are the major trends? Temperatures? Elements?
 - CMB
 - What are those small fluctuations and what do they do?
- The fate of the Universe
 - Three fates (Which is ours? How do we know?)
 - Dark matter: What is it? Evidence?
 - Dark energy: What is it? Evidence?

Cosmology Continue....

- Write down major events
 - First instant (no idea what's was going on)
 - The GUT era (quark fluctuations)
 - Inflation (quick increase of size)
 - Quark confinement
 - Annihilation of antimatter
 - Era of recombination
 - The Dark Ages
 - The first stars

Stellar System

- What is a star?
- The life of a star
 - What is the fusion processes in the star?
 - How does the universe make heavy elements?
 - Compare the lifespan of a massive star and a low-mass star.
- The evolution of star system
 - Molecular cloud: What is it?
 - Circumstellar disk: Why is it a disk?
 - Planets: Why are our planets different?

Stellar System Continue....

- Exoplanets
 - How do we find exoplanets?
 - Which method is the most useful one today?
 - Why do we mostly find massive exoplanets?
 - Where are most exoplanet located in their orbits?
- Star formation rate
 - How can we estimate the star formation rate in our galaxy?
 - What are the important factors to consider?

Earth

- Evolution of the Earth
 - What does the early Earth look like?
 - Right after formation?
 - In about 1 billion years?
 - What does the Earth look like today?
 - Why is the surface so young?
 - Does the habitable zone change?
- Moon
 - How might it help life on Earth?

Group Discussion

- Drake Equation
 - Write down the Drake Equation
 - What does each term mean?
 - How do we determine each term?
 - Those covered so far.
- Milky Way
 - Draw a picture of our galaxy
 - Where are we? i.e. Where is the Sun?

Life

- Why are molecules in molecular clouds interesting to life?
- What are the basic element of life?
 - How do they compare to elements in space/Earth/etc.?
- Where are they from?
- What is panspermia?
 - Why is interstellar panspermia so tough?

Questions from last year

- The seeds of Galaxies were due to?
- A) Quantum fluctuations in quark density.
- B) We don't yet know.
- C) Nuclear strong force fields.
- D) Large super structures in the early Universe.
- E) Gravitational instabilities in the fabric of space-time.

Questions from last year

- Which of the following is NOT evidence of the Big Bang?
- A) Inflation of the Early Universe.
- B) Cosmic microwave background.
- C) Big Bang Nucleosynthesis.
- D) Hubble's Law.
- E) All of the above

Questions from last year

- Nearly all galaxies are moving away from our Galaxy. What does this mean?
- A) The Universe is expanding.
- B) We are the center of the Universe.
- C) No one wants to play with us.
- D) We are actually the only moving galaxy.
- E) All particles are repelling each other.

Questions from last year

- The Sun's size is relatively constant because
- A) gravitational force of the planets
- B) atoms hold it together, like the Earth.
- C) it is big.
- D) neutrinos push against gravity
- E) the heat pressure from fusion perfectly balances the push of gravity.

Questions from last year

- If a dust cloud that is collapsing has any rotation at all, it will form a
- A) star that is not in hydrostatic equilibrium.
- B) planetary systems with rings.
- C) protoplanetary disk.
- D) star without planets.
- E) planetary nebula.

Questions from last year

- The rocky planets that formed around the first stars would have been?
- A) Too close to the massive star to have life.
- B) A perfect place to raise a family.
- C) Inhabited by truly alien creatures.
- D) Trick question. There would not have been any rocky planets.
- E) Devoid of the molecules necessary for life .

Questions from last year

- Which atom in HONC was the last to be produced in great quantities in the early Universe?
- A) C
- B) N
- C) H
- D) All produced at the same time
- E) O

Questions from last year

- Which statement about stellar evolution is the most correct?
- A) Very massive stars use up their fuel slowly.
- B) Iron is the last element to be produced by fusion, after that stars must collapse.
- C) Very high mass stars end their lives as red giants.
- D) When a star arrives on the main sequence it is fusing He into Carbon.
- E) Most of the heavy elements on the Earth were produced by the death of low-mass stars.

Questions from last year

- Which of the following is **not a possible fate of the Universe?**
- A) The Big Crunch (Closed Universe)
- B) The Casmir Effect (Zero Point Energy Universe)
- C) The Peter Out (Flat Universe)
- D) The Big Chill (Open Universe)
- E) none of the above

Questions from last year

- About 1 millisecond after the Big Bang, why did elementary particles, such as quarks, begin to form more complex particles?
- A) The First Stars forged them due to hydrostatic equilibrium.
- B) Intense heat and pressure forced them together.
- C) The Universe cooled, which allowed them to coalesce.
- D) The Cosmic Microwave Background radiation forced them together.
- E) None of the above.

Questions from last year

- A star is born. Which of the following did not happen?
- A) the strong force created a gravity instability
- B) a protoplanetary disk forms due to conservation of momentum
- C) fusion begins due to heat and pressure
- D) a gas cloud clumped because of gravity and began to collapse
- E) an outflow or jet of material is ejected from the system

Questions from last year

- Dark energy is
- A) accelerating the expansion of the Universe
- B) growing weaker as the Universe expands
- C) the dark side of the force
- D) 25% of all matter
- E) necessary to explain galaxy clusters
- F) the stored energy of dark matter

Questions from last year

- We have only detected Jupiter sized planets around other stars because
- A) the technology of the detection techniques can not detect smaller planets yet
- B) Jupiter-type planets are just nicer to look at
- C) small planets like those in our solar system are freak occurrences
- D) they represent burned up corpses of binary star systems
- E) smaller planets collide with the star

Questions from last year

- How are the stars forming today different than the first stars?
- A) stars today are powered by fusion, while the first stars used fission
- B) stars today burn brighter, as they have better fuel sources
- C) stars today are smaller because most of the hydrogen is gone
- D) stars today do not burn as bright, because they are more massive and harder to heat up than the first stars
- E) stars today have heavier elements in them, inherited from the earlier generation of stars.